

What is claimed is:

1. An inductively coupled antenna for installation on a reaction chamber of an inductively coupled plasma (ICP) processing apparatus and for connection to a radio frequency (RF) power source to induce an electric field for ionizing a reactant gas injected into the reaction chamber and for generating plasma, the inductively coupled antenna comprising a coil having a plurality of turns including an outermost turn and a plurality of inner turns, wherein a current flowing through the outermost turn is larger than a current flowing through the plurality of inner turns.

2. The inductively coupled antenna as claimed in claim 1, wherein the outermost turn and the plurality of inner turns are connected to the RF power supply in parallel and the plurality of inner turns are connected to each other in series.

3. The inductively coupled antenna as claimed in claim 1, wherein a sum of lengths of the plurality of inner turns is longer than a length of the outermost turn.

4. The inductively coupled antenna as claimed in claim 1, wherein the plurality of turns is concentrically formed.

5. The inductively coupled antenna as claimed in claim 1, wherein the plurality of turns is formed of a single conductive line.

6. The inductively coupled antenna as claimed in claim 1 further comprising:

a conductive metal tube having a cooling path; and

a conductive metal strip that is electrically and thermally connected to a lower portion of the conductive metal tube.

7. The inductively coupled antenna as claimed in claim 6, wherein the conductive metal tube is formed of copper.

8. The inductively coupled antenna as claimed in claim 6, wherein the conductive metal tube has a circular cross-section.

9. The inductively coupled antenna as claimed in claim 6, wherein the conductive metal strip has a tall and narrow rectangular cross-section.

10. The inductively coupled antenna as claimed in claim 6, wherein a height of the metal strip gradually decreases from a center portion to an edge portion of the antenna.

11. An inductively coupled plasma (ICP) processing apparatus, comprising:

a reaction chamber maintained in a vacuum state;

an antenna installed on the reaction chamber to induce an electric field for ionizing a reactant gas injected into the reaction chamber and for generating plasma; and

a RF power source that is connected to the antenna to supply RF power,

wherein the antenna is formed of a coil having a plurality of turns, including an outermost turn and a plurality of inner turns, and wherein a current flowing through the outermost turn is larger than a current flowing through the plurality of inner turns.

12. The ICP processing apparatus as claimed in claim 11, wherein the outermost turn and the plurality of inner turns are connected to the RF power supply in parallel and the plurality of inner turns are connected to each other in series.

13. The ICP processing apparatus as claimed in claim 11, wherein a sum of lengths of the plurality of inner turns is longer than a length of the outermost turn.

14. The ICP processing apparatus as claimed in claim 11, wherein the plurality of turns is concentrically formed.

15. The ICP processing apparatus as claimed in claim 11, wherein the plurality of turns is formed of a single conductive line.

16. The ICP processing apparatus as claimed in claim 11 further comprising:

a conductive metal tube having a cooling path; and

a conductive metal strip that is electrically and thermally connected to a lower portion of the conductive metal tube.

17. The ICP processing apparatus as claimed in claim 16, wherein the conductive metal tube is formed of copper.

18. The ICP processing apparatus as claimed in claim 16, wherein the conductive metal tube has a circular cross-section.

19. The ICP processing apparatus as claimed in claim 16, wherein the conductive metal strip has a tall and narrow rectangular cross-section.

20. The ICP processing apparatus as claimed in claim 16,
wherein a height of the metal strip gradually decreases from a center portion
to an edge portion of the antenna.